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AUTHOR	Moran, Mary Ross
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INSTITUTE FOR RESEARCH IN LEARNING DISABILITIES
The University of Kansas
Lawrence, Kansas, 66045
Emphasis on Adolescents and Young Adults

A COMPARISON OF FORMAL FEATURES OF WRITTEN LANGUAGE OF LEARNING DISABLED, LOW-ACHIEVING AND ACHIEVING SECONDARY STUDENTS

Mary Ross Moran

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The University of Kansas Institute for Research in Learning Disabilities is supported by a contract (#300-77-0494) with the Bureau of Education for the Handicapped, Department of Health, Education, and Welfare, U. S. Office of Education, through Title VI-G of Public Law 91-230. The University of Kansas Institute, a joint research effort involving the Department of Special Education and the Bureau of Child Research, has specified the learning disabled adolescent and young adult as the target population. The major responsibility of the Institute is to develop effective means of identifying learning disabled populations at the secondary level and to construct interventions that will have an effect upon school performance and life adjustment. Many areas of research have been designed to study the problems of LD adolescents and young adults in both school and non-school settings (e.g., employment, juvenile justice, military, etc.)

Director: Donald D. Deshler

Research Coordinator: Jean B. Schumaker

Institute for Research in Learning Disabilities
The University of Kansas
313 Carruth-O'Leary Hall
Lawrence, Kansas 66045

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COOPERATING AGENCIES

Were it not for the cooperation of many agencies in the public and private sector, the research efforts of The University of Kansas Institute for Research in Learning Disabilities could not be conducted. The Institute has maintained an on-going dialogue with participating school districts and agencies to give focus to the research questions and issues that we address as an Institute. We see this dialogue as a means of reducing the gap between research and practice. This communication also allows us to design procedures that: (a) protect the LD adolescent or young adult, (b) disrupt the on-going program as little as possible, and (c) provide appropriate research data.

The majority of our research to this time has been conducted in public school settings in both Kansas and Missouri. School districts in Kansas which have or currently are participating in various studies include: Unified School District USD 384, Blue Valley; USD 500, Kansas City, Kansas; USD 469, Lansing; USD 497, Lawrence; USD 453, Leavenworth; USD 233, Olathe; USD 305, Salina; USD 450, Shawnee Heights; USD 512, Shawnee Mission; USD 464, Tonganoxie; USD 202, Turner; and USD 501, Topeka. Studies are also being conducted in several school districts in Missouri, including Center School District, Kansas City, Missouri, the New School for Human Education, Kansas City, Missouri; the Kansas City, Missouri School District; the Raytown, Missouri School District; and the School District of St. Joseph, St. Joseph, Missouri. Other participating districts include: Delta County, Colorado School District; Montrose County, Colorado School District; Elkhart Community Schools, Elkhart, Indiana; and Beaverton School District, Beaverton, Oregon. Many Child Service Demonstration Centers throughout the country have also contributed to our efforts.

Agencies currently participating in research in the juvenile justice system are the Overland Park, Kansas Youth Diversion Project, and the Douglas, Johnson, Leavenworth, and Sedgwick County, Kansas Juvenile Courts. Other agencies which have participated in out-of-school studies are: Penn House and Achievement Place of Lawrence, Kansas; Kansas State Industrial Reformatory, Hutchinson, Kansas; the U. S. Military; and Job Corps. Numerous employers in the public and private sector have also aided us with studies in employment.

While the agencies mentioned above allowed us to contact individuals and support our efforts, the cooperation of those individuals--LD adolescents and young adults; parents; professionals in education, the criminal justice system, the business community, and the military--have provided the valuable data for our research. This information will assist us in our research endeavors that have the potential of yielding greatest payoff for interventions with the LD adolescent and young adult.

A COMPARISON OF FORMAL FEATURES OF WRITTEN LANGUAGE OF LEARNING DISABLED, LOW-ACHIEVING AND ACHIEVING SECONDARY STUDENTS

ABSTRACT

The written language characteristics of 26 learning disabled (LD), 26 low-achieving (LA) and 26 achieving (ACH) students in grades 7 through 10 were measured using paragraph-writing and topic-sentence tasks. Following application of analytic scoring systems, data were compared by means of a distribution-free, non-directional two-sample rank test.

Tests of differences between the LD and LA groups on written paragraphs revealed that spelling was the only formal feature which was significantly higher in the LA group. Comparisons of LD and ACH groups disclosed significantly higher scores for the ACH students on conventions, spelling, mechanics and mean morphemes per T-unit. However, inspection revealed that the LD students were similar to the ACH students in flexibility of sentence types and word types, and in percentage of complex T-units.

Findings thus indicated that only spelling discriminates LD students from the pool of low-achieving students demonstrating average intellectual functioning. Results further disclosed that LD students differ from achieving students on four formal features of written language. Patterns revealed by inspection indicate strengths among LD writers, arguing for evaluation systems based upon T-units rather than sentence units and for measurement of more substantive features of written expression.

Introduction

Research on Written Language

Although studies of the written language patterns of learning disabled students have been few (Sitko & Gillespie, 1978), the inclusion of written language disorders as a characteristic of the population from the 1960's through formulation of the most recent federal definition attests to the strength of anecdotal reports of written language problems among this group. Alley and Deshler (1979) summarized the available information in their report that LD adolescents demonstrated poor organization, limited vocabulary, inadequate monitoring of their products, and a high frequency of spelling, capitalization and punctuation errors.

Perhaps because written language is the most complex language skill, uniform bases for judgments of the quality of written products have not been established. Educators have not agreed upon the specific elements which comprise quality (Howerton, Jacobson, & Selden, 1977); therefore, researchers have attempted to identify empirically those components of the writing task which contribute to judgments of acceptable and unacceptable written products.

In their efforts to describe discriminating features, investigators have developed a number of analytic methods of rating separately each formal component of the product rather than adopting a holistic approach of assigning a single rating on the basis of the overall effect. Furthermore, researchers have strongly tended to emphasize formal aspects over content. Howerton et al., in a critical review of the research on evaluation of written language, concluded that "the primary goal of these studies . . . appears to have been the analysis of the elements themselves rather than the determination of their relationships to the quality of written composition" (p. 7).

Research findings have described those formal aspects that discriminate good writers from poor writers. Among the components which are well represented in research and on tests of writing skills are grammar, fluency, spelling, and the mechanics of capitalization and punctuation.

Since English grammar is more dependent upon word order than upon affixes to show relationships among parts of sentences, researchers have emphasized measures of syntax over inflections such as markers for tense, number and possession. Measures of syntactic maturity overlap to some extent with measures of fluency, since most researchers have considered both the correctness of the syntactic structure and the frequency of use of complex structures in making judgments about maturity of written expression.

The basis for most recent scoring systems is the "minimal terminal unit" or "T-unit" which was defined by its originator as "one main clause plus any subordinate clause or non-clausal structure that is attached to or embedded in it" (Hunt, 1970, p. 4). The T-unit has the advantage of permitting analysis of subject-predicate relationships independent of the writer's punctuation or capitalization signals for conventional sentence boundaries. Since many writers fail to offer sentence boundary signals but instead produce run-on structures or mark fragments as if they were sentences, the T-unit measure permits disregard of such mechanics to concentrate on the clause as the unit of measurement rather than the punctuated and capitalized sentence. The T-unit

measure does not alter the classification of simple sentences, comprised of one main clause, or of complex sentences, comprised of one main clause and one or more subordinate or embedded clauses. Compound sentences and compound/complex sentences, however, are restructured by this system into two or more T-units for analysis.

Golub and Kidder's (1974) Syntactic Density Score (SDS) emerged from examination of 63 structures subjected to a multivariate analysis to determine how teachers' ratings of written samples related to the presence of specific structural features. Among ten structures which emerged as most predictive of a high rating by teachers were syntactic measures such as words per T-unit, subordinate clauses per T-unit, mean length of main clause in words and mean length of subordinate clauses in words.

Although a researcher using Golub's system can analyze a 500-word sample in 30 minutes by employing a computer program, O'Donnell (1976) contended that the measure is a complex and expensive procedure which offers few advantages over more gross measures of T-unit length and number of subordinate clauses. O'Donnell argued that since T-unit length is highly correlated with the SDS and can be computed less expensively, the T-unit measure alone is more desirable.

Scoring systems employing the T-unit as the basic measure have consistently demonstrated that number of words per T-unit increases as students mature. Hunt (1965) analyzed length of T-units in writing samples from grades 4, 8 and 12 and from skilled adult writers. He reported 11.3 words per T-unit for grade 8, 14.4 for grade 12, and 20.3 for adults. A later study (1970) produced slightly lower averages of 9.8 at grade 8 through 14.8 for skilled adults, with an increase of about one word per grade on the average. O'Donnell, Griffin, and Norris (1967) replicated Hunt's earlier findings, reporting 9.8 words per T-unit at grade 7. Loban (1976) also demonstrated, in a longitudinal study which followed 211 students through grade 12, that the average number of words per unit increased from grade to grade.

Dilworth, Reising, and Wolfe (1978) employed 1,063 high school subjects to determine that "superior students tended to increase their words per T-unit as paper length increased, but typical students did not do so" (p. 103). Thus, these researchers made a distinction between measuring productivity for an entire paper and measuring productivity within a single T-unit, with the latter measure correlating with judges' ratings of superior writing. Gebhard (1978) reported that professional writers and college freshmen whose writing was rated as <u>good</u> used T-units marked by dependent subordinate clauses or deletion rules, while poor writers tended to join simple T-units by coordination.

Researchers who have examined the written products of groups of reading disabled or learning disabled subjects have not employed the T-unit as the measure of syntactic performance. Both Myklebust (1973) and Weiner (1980), using the sentence as the basic measure, reported problems with word order among reading disabled subjects. Myklebust's data revealed an early maturation of syntactic ability, with no improvement in mean scores after age 11. Weiner included 10 items under syntactic errors; she demonstrated significant differences between 14 reading disabled and 17 achieving subjects on a summary score which included measures of fragments, run-on sentences, coordination, subordination, and tense, plural and possessive endings. Poteet (1979) found that only one of 85 learning disabled students made errors in word order.

However, 36 LD students omitted essential words and 15 substituted words. Word endings were omitted by 26% of 85 LD and 23% of 124 non-LD students in Poteet's sample.

In a detailed case study of a single learning disabled adolescent, McGill-Franzen (1979) used a combination of evaluation techniques to identify strengths as well as deficits. Employing syntactic analysis as defined by Hunt (1977) to identify early and late developing structures, she found that the 17-year-old subject used two gerund phrases which occurred only rarely among Hunt's average 12th-grade students. Fluency was established by mean words per T-unit of 13.6 which compared favorably with Hunt's data. Application of primary-trait scoring (Lloyd-Jones, 1977) revealed that the content of the subject's paragraph was appropriate for the assignment and included supporting elaborated reasons for his statements. Although the writing sample lacked punctuation and capitalization, contained numerous misspelled words, and included both run-on sentences and fragments, strengths in syntactic maturity, fluency and argument could be identified.

Traditionally, fluency in written language has been measured by counting the number of words per sentence or per story. Myklebust (1973) reported that the number of words used per story grows rapidly up to age 13, then increases more slowly up to age 17. His reading disabled students wrote fewer words per story than did achieving students. Poteet (1979) discovered that his learning disabled students wrote an average of 18 words, 2.5 sentences and 7.5 words per sentence compared with achieving students who averaged 48 words, 6 sentences and 9 words per sentence. Weiner (1980) reported that productivity averaging 29 words for reading disabled and 53 words for achieving students was significantly different. College freshmen papers which had been rated as superior averaged 60% more T-units than those rated poor (Gebhard, 1978).

Fluency has also been measured as different types of words used. In Golub's (1974) system, the scores which were most predictive of high ratings by teachers were number of modal auxiliary verbs, number of be and have auxiliaries, number of prepositions, number of possessives, number of adverbs of time, number of gerunds, participles and optional modifiers.

Systems for categorizing spelling errors have employed one of four units of measurement--whole words, syllables, sound clusters, and letter units. Although each of these bases for categorization has had its advocates, the strongest support in the literature appears to favor the letter unit. As White and Haring (1976) pointed out, the letter is the basic unit of spelling behavior since sound clusters are formed with many interchangeable letters. A rationale for using letter units to evaluate spelling performance of only those learners who are experiencing difficulty in acquiring a spelling vocabulary is offered by Lessen (1980). This procedure is presented as offering the advantage of distinguishing parts correct from parts incorrect and thus gaining an extensive analysis of individual instructional needs.

Among recent reports of comparison of spelling performance, only Weiner (1980) used a writing sample rather than dictated spelling lists. Results of a comparison of 14 reading disabled and 17 achieving boys demonstrated that two categories of orthographic and phonologic errors, summarizing 16 subcategories, were significantly different between the two groups. Unfortunately, errors were not reported by subcategories for detailed comparison. In another

comparison of normally-achieving readers and readers termed dyslexic, using spelling from dictation, Boder (1971) found that the achieving group could spell 70 to 100% of their sight vocabularies up to their nominal grade-level lists. In contrast, the dyslexic group of 107 children spelled 0 to 40% of the words in their sight vocabularies up to their grade level.

Though developmental mastery of mechanical skills may be a factor among younger students, May (1977) found no significant differences in punctuation between or within T-units by eighth-grade students as compared with twelfth-grade students. Higgins (1975) reported that approximately 50% of his college-freshmen subjects misused commas and apostrophes, but Mazur (1976) found among younger subjects that 73% used no end punctuation and 65% omitted capital letters at the beginning of sentences. Mazur's subjects across grades 3 through 8 made similar errors in end punctuation, occurrences of run-on sentences and omission of capital letters at the beginning of a sentence regardless of grade placement. Poteet (1979) reported that LD subjects' most frequent errors were in punctuation and capitalization, with punctuation errors significantly more frequent among LD than among achieving students.

The available literature thus describes in some detail the written language skills of achieving students in grades 7 through 12. Studies which have compared reading disabled or learning disabled groups with achieving peers have consistently described the under-achievers as differing significantly on measures of sentence structure, fluency, spelling and mechanics.

Rationale for the Study

This review of the literature has revealed that written language characteristics of achieving adolescents have been widely studied, with particular emphasis upon syntactic skills. Several researchers have developed comprehensive analytic scoring systems and some have applied such scoring systems to free writing. However, the literature does not include application of detailed analytic scoring systems employing T-unit analysis to the writing of learning disabled or underachieving adolescents. The few studies of written language of younger learning disabled students which have been reported have analyzed narrative rather than expository writing. Studies of writing skills of reading disabled students have been concentrated upon younger age groups.

Extension of T-unit analysis to written products of learning disabled students permits analysis of the strengths in sentence formulation which have been masked by analysis limited to the sentence as the unit of measurement. The application of fluency measures such as frequency counts of specific types of word classes permits description of the flexibility of word selection which is not disclosed through experimental tasks constraining a specific response.

Although mean length of utterance in morphemes is well established as a measure of oral language skill among younger subjects, this measure has not been applied to oral language of adolescents nor has it been applied to written products. Since the frequency count of morphemes permits description of the relative sophistication of vocabulary in terms of polysyllabic words and affixes, it provides a dimension beyond the measure of words per T-unit which has been widely used in studies of written language.

Studies of spelling performance have most frequently been based upon standardized spelling-recognition tests or writing spelling words to dictation. Analysis of spelling performance of learning disabled students in free writing does not appear in the literature, nor has a comparison of learning disabled spellers with underachievers been reported.

Methodology

Purpose

This investigation was designed to extend detailed analytic procedures for measuring maturity in written language to two specific groups of underachievers. Learning disabled students were compared with low-achieving students of average intellectual functioning to determine whether learning disabled writers would differ from age and grade peers when achievement levels were held constant. Learning disabled writers were also compared with normally-achieving peers to discover specific patterns of difference on some of the measures reported for achieving students by previous researchers.

Subjects

Subject selection was based on criteria established by The University of Kansas Institute for Research in Learning Disabilities (Schumaker, Warner, Deshler, & Alley, 1980). In four cooperating schools in a midwestern metropolitan area, principals were asked to provide lists of students in grades 7 through 10 who met criteria for inclusion in either of two groups--learning disabled (LD) or low achievers (LA). For the LD group, principals were given the following criteria: (a) receiving services on the basis of a school district diagnosis as learning disabled; (b) exhibiting deficits in at least one of eight areas--math calculation, math reasoning, reading recognition, reading comprehension, oral expression, written expression, listening, or spelling as measured by achievement tests; (c) showing no evidence of mental retardation, emotional disturbance, economic disadvantage, cultural disadvantage or environmental disadvantage; and (d) having no physical or sensory handicap. Low achievers were to meet the following criteria: (a) receiving no special services; (b) having received an F or a D grade in at least one academic core (English, social studies, science, math) course during the previous semester; (c) demonstrating no evidence of mental retardation, emotional disturbance, sensory or physical handicap; and (d) having scored below the 33rd percentile on at least one subtest of the most recently administered achievement battery. For subjects who met the LD criteria, data from school records were submitted to a Validation Team composed of two school psychologists and two experienced secondary LD teachers. Subjects judged as LD by three of the four evaluators became the final sample of 26 LD students. (For more information regarding this validation process, see Schumaker, Warner, Deshler and Alley, 1980). An equal number of LA subjects was randomly selected from a pool of 31.

The achieving group (ACH) was selected by providing principals with letters of informed consent and asking them to distribute the letters randomly to students who had earned no grade lower than C for the previous semester. Sixty letters of informed consent were distributed, 15 in each building. Students returned 44 signed letters. A random selection was made through a blind drawing of consent letters so that the achieving subject pool consisted of 30 students. After LD subjects were validated, the ACH sample was reduced to 26 by randomly discarding four protocols from this pool of 30.

The mean age of the LD group was 14 years, 11 months. Mean grade placement was 8.5. Using the highest figure listed on Verbal, Performance or Full-Scale measures on an individually administered test, the IQ range was found to be 86 to 129 with a mean of 101.3. The median percentile rank for 19 students for whom a recent achievement battery was available was the 23%ile. The LD group included 16 boys and 10 girls.

The mean age of the LA group was 14 years, 2 months. Mean grade level was 8.3. On group tests administered in the classroom, the IQ range was 84 to 123 with a mean of 99.9. The median percentile rank on the latest achievement battery for 21 members of this group was the 36%ile. The LA group included 15 boys and 11 girls.

The mean age of the ACH group was 13 years, 8 months. Mean grade placement was 9.2. The IQ range, as measured by group tests, was 99 to 130 with a mean of 109.6 for 20 students for whom these scores were available. Median percentile rank of available achievement batteries for 20 members of this group was the 68%ile. The ACH group included 11 boys and 15 girls.

Discrepancies in mean grade level and chronological age across the three groups are accounted for by records of retention in earlier grades. Some subjects in both the LD and LA samples had repeated a grade. Since the skills tapped by this experiment are included in scope-and-sequence charts and language-arts textbooks for grades five and six, the higher mean grade placement for the ACH group was not considered a limitation on the study.

Two LA subjects in the original pool were judged after testing to be speakers of Black English; because the analytic scoring system was based entirely upon standard English, these two subjects were omitted from the final pool. Since the letter of informed consent included a question about the language spoken in the home, any subject indicating that a language other than English was spoken by the family was also eliminated from the pool. The final sample of 78 subjects included two black students and five Hispanic students, all of whom were judged by the principal investigator, on the basis of written paragraphs and transcripts of oral language, to be speakers of standard English.

Setting

Subjects were drawn from one senior high and one junior high in an urban district with a heterogeneous population in terms of socioeconomic and racial characteristics, and from one senior high and one middle school in a suburban-rural district with a broad socioeconomic base but few minority students.

The study was conducted in each subject's school, in a room designated by the principal. In two buildings, subjects were released from core classes with consent of the instructor; in two other buildings, students were scheduled only during resource room time, gym classes or study hall.

Stimulus Materials and Measurement Systems

Rationale. Stewart (1978) pointed out that when spontaneous language formulation is studied, the influence of the subject matter upon the structures produced must be taken into account, as the content may control the sentence structures chosen as much as do the age and syntactic capabilities of the

subject. Thus, Stewart said, it may be invalid to compare narrative writing about a subjective experience or a fantasy with, for example, expository writing such as objective description or enumeration of facts. The first reason for developing novel testing instruments for this study was to provide a measure of writing which could tap either persuasive or explanatory skills (Lloyd-Jones, 1977) required for core classes such as science and social studies.

The second reason for developing novel materials was to control the amount of reading to be done by the subject. Many of the widely reported stimulus materials for measurement of secondary writing skills place heavy demands on reading skills. For example, Dilworth et al. (1978) sent out a poem which was to be read by the subject who then wrote about the meaning of the poem or how it made the subject feel. The researchers did not report instructing participating English chairpersons to present the materials only to those subjects who could demonstrate the ability to read the difficult poem, nor did the investigators report a readability level for the material.

Some of the expository subject matter used in well-designed and replicated studies also raises questions about motivation value. For example, O'Donnell and associates (1967) produced an instrument consisting of 32 short, active declarative sentences which subjects were instructed to rewrite "in a better way". The stated purpose was to stabilize subject matter, and thus render the results more readily comparable across subjects. In a pilot study, subjects added and subtracted so much material that additional directions were included to keep the subjects on the topic. However, the topic is Aluminum, and the 32 sentences describe how the metal is produced from ore. In addition to the problem of requiring reading of such words as bauxite, oxygen and electricity, the passage would appear to have a further disadvantage for adolescent learning disabled subjects of failing to engage much interest. Thus, the third reason for developing novel materials was to appeal to the interest level of students in grades 7 through 10.

The topics and procedures of the present study were designed for application to marginally motivated students with low reading ability. Topics were intended to represent general-information subject matter which would be within the experience of students between the ages of 12 and 16. Non-academic subject matter was selected because of the broad variability in scope and sequence of materials across schools and also because underachievers could not be expected to demonstrate optimal skills on material which may be emotionally charged because of association with school failure.

An analytic scoring system was selected because holistic methods have been shown to penalize students with uneven mastery of mechanics (Dilworth, et al., 1978; McGill-Franzen, 1979). Harris's (1977) comparison of teachers' reports of their criteria for holistic scoring with observed data indicated that teachers are in fact more strongly influenced by mechanical errors than content when rating written products. Analytic scoring provides opportunities for detailed comparisons of subcomponents of written and oral language. Such a detailed analysis is prerequisite to development of individualized remediation which recognizes strengths as well as deficits.

DEEP task. The Diagnostic Evaluation of Expository Paragraphs (DEEP) consisted of a set of stimulus materials and an analytic scoring system.

Stimuli consisted of two forms, A and B, of four 4" by 6" index cards, hereafter called topic cards, each of which displayed one typewritten topic devised for this experiment as follows:

Argue that one kind of music is best (A)
Argue that one sport is best (B)
Describe the steps in playing one game (A)
Describe the steps in making a sandwich (B)
Compare soccer with one other sport (A)
Compare rock with one other type of music (B)
Explain why roles for men and women are changing (A)
Explain why energy is a problem (B)

The DEEP scoring system, drawn from a variety of analytic systems described in the literature, was devised for this experiment. Components are described below:

1. Conventions. Conventions are those features of written expression which are governed by oral and written language rules, as opposed to mechanical rules which are scorable only for written forms of language. All Convention items were analyzed on the basis of percentage correct. That is, correct occurrences of these items were counted, then divided by the total of correct and erroneous or omitted items to yield a percentage correct. Subgroups within Conventions were:

a. Verb markers for tense and aspect - play*ed*, play*ing* . . .

b. Noun markers for plurality - card*s*, watch*es*, children . . .

c. Possessive forms of nouns and pronouns - John*'s*, your, his, my . . .

d. Subject-predicate number agreement - The batter_ hit*s*; batter*s* hit_ . . .

e. Pronoun-referent number agreement - Batter*s* run *their* bases

Tense, plural and possessive markers were counted for the presence or absence of the morpheme alone; no consideration was given within this category to the correctness of spelling or the presence of the apostrophe. Thus the words walkd, bookz and peoples were counted correct for the presence of the morpheme even though the first lacks an e, the second substitutes z for s, and the third lacks the apostrophe in a possessive context. Such errors were considered under the categories of spelling and punctuation, on the premise that the marker was present.

2. Fluency. Fluency is a measure of productivity and flexibility of the subject's language. Although some researchers have made a distinction between correctness of sentence structure and variety of sentence structure, the DEEP scoring system considers both syntactic measures as aspects of fluency in written language. Subcategories under Fluency are defined for scoring purposes as stylistic options rather than basic language conventions. That is, items under Conventions are constrained; having chosen a plural subject, the speaker or writer is constrained to provide a verb which agrees in number. In contrast, Fluency items are free to vary; a writer may choose to use a simple or a

complex sentence, to write 50 words or 80, to insert three adjectives or none. Fluency items are subdivided into productivity items and flexibility items. All are measured in simple frequency counts or percentage correct with the exception of Mean Morphemes per T-unit (MMTU) which involves calculation of an average. Productivity items were the following:

a. Frequency count of total words in paragraph

b. Frequency count of total morphemes in paragraph -
un/cover/ed = 3 morphemes

c. Mean morphemes per T-unit -
124 morphemes divided by 8 T-units = 15.5 MMTU

Flexibility in formulation of sentence types was measured by calculating a percentage of each sentence type as punctuated by the subject. The number of simple sentences, for example, was divided by the total number of sentences to yield a percentage.

a. Percentage of simple sentences - "Football is a popular game."

b. Percentage of compound sentences - "Football is a popular game, but many fans prefer basketball."

c. Percentage of complex sentences - "Because it is a fast-moving game, many fans enjoy basketball."

d. Percentage of compound/complex sentences - "Some fans prefer basketball because it's a fast-moving game, but football is more popular."

Flexibility in formulation of T-units was analyzed, disregarding the mechanics of capitalization and punctuation as follows:

a. Percentage of simple T-units - "Many fans like basketball some don't." = 2 simple T-units;
No. simple ÷ simple + complex = % of simple T-units

b. Percentage of complex t-units - "Some people like basketball. Because it is a fast game." = 1 complex T-unit
No. complex ÷ simple + complex = % of complex T-units

Eight categories of words comprised a measure of flexibility in Word Selection. Words in each category were simply counted to yield a frequency of use for each category. The categories were:

a. Descriptive adjectives - <u>small</u>, <u>round</u>, <u>black</u>, <u>funny</u> . . .

b. Adverbs of time, place manner - <u>later</u>, <u>down</u>, <u>slowly</u> . . .

c. Secondary verbs - participles: the <u>fallen</u> leaves
gerunds: <u>running</u> is fun
infinitives: <u>to play</u> baseball . . .

d. Modal auxiliaries - can, may, might, could, should . . .

e. Auxiliaries have and be - times have changed, they were playing

f. Prepositions - in, on, under, around, between . . .

g. Conjunctions - but, so, until, because, whether . . .
Note: And was omitted from the frequency count even if correct compound sentences because coordination with and is considered an immature form which is overused by beginning writers (Hunt, 1965).

h. Determiners - Only the articles a, an, the were counted

Run-on sentences were segmented into either complex or simple T-units according to the logic of relationships among independent and dependent clauses written without sentence boundary markers of period and capital letter. For all Fluency items, fragments which could not be incorporated into the preceding or following T-unit were disregarded for scoring purposes. That is, if the subject wrote two T-units with a fragment between them which could not logically be associated with either of the T-units, that fragment was marked off with brackets and no morphemes or Word Selection items within that fragment were counted. This limitation was intended to prevent inflating Fluency scores with volumes of unrelated words which were not incorporated into propositions consisting of subject and predicate.

3. Spelling. The percentage of words correct was calculated by dividing the number of correctly spelled words by the total of both correct and misspelled words. Illegible words were counted as misspellings. Each correctly spelled word was counted even if the same word appeared more than once in the paragraph. Similarly, in calculating the percentage correct, each misspelled word was counted even if it was a repetition.

When misspelled words were placed into categories for analysis of patterns, exact repetitions were not classified a second time. For the pattern analysis, using the categories listed below, a single word might be classified under two or more categories if the misspelling incorporated two or more types of errors. Spelling errors were categorized as follows:

a. Single vowel required (the vowel must be sounded)
Omission - m_ny
Substitution - manea (single vowel or cluster is substituted)
Insertion - mainy (must be a different vowel)

b. Vowel cluster required (any two or more different vowels regardless of pronunciation)
Omission - bec_use (remaining vowel is correct)
Substitution - becose (a vowel other than those constrained)
Insertion - becaeuse

c. Double vowel required, or single vowel required but doubled
Omission - fe_l
Substitution - fiel
Insertion - feeal or buut

d. Silent vowel required or vowel added in silent /e/ position
   Omission - lat_
   Insertion - bute

e. Single consonant required (the consonant must be sounded)
   Omission - my_elf
   Substitution - mycelf
   Insertion - mysteIf

f. Consonant cluster required (any two or more different consonants, whether blended or not)
   Omission - wa_ch
   Substitution - wak or wast
   Insertion - watkch

g. Double consonant required or single vowel required but doubled
   Omission - put_ing
   Substitution - pudding or puding
   Insertion - puttinng

h. Silent consonant required or consonant added which is not sounded in standard pronunciation
   Omission - i_land
   Substitution - iyland
   Insertion - istland or tack (for take)

i. Homophone
   Substitution - aloud (allowed)

j. Sequence
   Substitution - feild

k. Vowel-consonant or consonant-vowel combination (any sounded combination, whether it constitutes an entire syllable or not)
   Omission - Am__icuns
   Insertion - ezierer

l. Spacing Error
   Expansion - with out
   Compression - alot

m. Form reversal
   epual (instead of equal)

n. Illegible or attempted word which is indecipherable in context
   evopadhing

This classification system for spelling errors is based on the visual representation of the word as the standard. The assumption is that words written spontaneously, as opposed to words written in response to dictation, need not pass through the auditory system of the language. Therefore, this scoring system does not include a category for words spelled phonetically, which would require an inference on the part of the scorer as to how the writer pronounced the word.

4. Mechanics. For scoring purposes, Mechanics include all formal measures which are applicable to written language but which have no relevance for oral language. This category includes capitalization, punctuation, legibility and indentation. An additional item, person, overlapping form and content, was placed in this category because it is a requirement for written language but not for oral language. Subcategories were scored as follows:

a. Capitalization - The initial word in each group of words punctuated as a sentence was scored for the presence or absence of a capital letter. In the absence of punctuation cues, the first word in a new T-unit was scored for the presence or absence of a capital letter. Proper nouns which appeared in the paragraph were scored for the presence or absence of a capital letter. The percentage of correct capitalization was then calculated by dividing the raw number of correct items by the total of the correct plus the incorrect items or the opportunities for correct capitalization.

b. Punctuation - The period, apostrophe and hyphen were scored for presence or absence wherever constrained. Periods, apostrophes or hyphens were scored as errors when they appeared in inappropriate places. Periods at the end of fragments were considered errors. In run-on sentences, periods were considered to be required after each T-unit or after two T-units joined by a coordinating conjunction. Commas were scored for presence if they were correctly used in a series, around nonrestrictive clauses, or following introductory phrases or clauses in a sentence. However, commas were scored for absence only in a series or around nonrestrictive clauses since the use of a comma following introductory phrases or clauses is a divided usage. Commas after introductory prepositional phrases or dependent clauses were thus considered to be constrained only if the scorer was forced to read the passage more than once in order to comprehend it. In that case, the absence of the comma was scored. The total of the correct use of punctuation was then divided by the total of correct and incorrect uses to yield a percentage correct for punctuation.

c. Legibility - This was the first item scored for the paragraph. On the initial reading, the scorer placed a check mark above any word which s/he read twice or more before deciphering it. Check marks were counted and deducted from the total words written. The number of legible words was divided by the total words to yield a legibility percentage.

d. Indentation - This item was scored either plus or minus. The writer had only to offset the initial line toward the right side to receive the plus score; no specific measure such as indenting five spaces was applied.

e. Person - This item was scored either plus or minus, on the basis of whether the writer maintained first, second or third person throughout the paragraph. All were considered appropriate; however, if the writer began with second person and shifted to third person, for example, this category was scored minus.

The last three items were analyzed by inspection. Because illegible words had already been counted as misspellings, the legibility percentage was not included in the Mechanics score which was statistically tested. Including both legibility and spelling scores would have penalized a subject twice for the same error and jeopardized the independence of the categories. Neither Indentation nor Person yielded quantitative scores which could be summed with other scores. Therefore, only Capitalization and Punctuation raw scores were summed and divided by the total number of opportunities for capitalization and punctuation to calculate the Mechanics percentage which was subjected to statistical tests.

ETC task. The Evaluation of Topic-sentence Construction (ETC) task consisted of two forms of stimulus cards and a set of scoring guidelines for quantitative assessment of topic sentences generated by a subject. Stimuli were sets of six 4" by 6" white index cards, each of which displayed one typewritten sentence. In each set of six sentences, three had been formulated to convey positive statements about the topic, and three had been formulated to present negative ideas on the same topic. The cards were numbered and always presented in prescribed order so that positive and negative comments were randomized for presentation. The length of sentences was controlled at nine morphemes or less; only one reached a length of 10 morphemes. Two forms of the stimuli were randomized for presentation. Form A, on the topic of running, employed the following detail sentences:

Running helps the heart and lungs.
Runners are sometimes hit by cars.
Running helps keep weight down.
Runners say they sleep well.
Dogs often bite runners.
Running causes sore muscles and feet.

Form B, on the topic of teenage ownership of cars, presented the following detail sentences:

Owning a car can help get a job.
Teens have a lot of car accidents.
A car gives teens more freedom.
A car improves social life.
Car insurance costs a lot.
Keeping up a car takes time.

Scoring of the ETC was based on a graduated set of statements which represented possible combinations of selections plus the level of abstraction of the sentence and its grammaticality. The hierarchy consisted of eight levels, with the first earning the highest point score.

8. Summary of 2 positive and 2 negative statements
   Higher level of abstraction than stimulus statements
   Complete grammatical sentence
   Example: There are both advantages and disadvantages to having a car.

7. Summary of 3 positive or 3 negative statements
   Higher level of abstraction than stimulus statements
   Complete grammatical sentence
   Example: Running keeps you in good health, OR Running can be dangerous.

6. Summary of 2 positive and 2 negative statements or of 3 positive or 3 negative statements
   Higher level of abstraction than stimulus statements
   Sentence not complete or sentence ungrammatical in part
   Example: By running, it could help you stay in shape.

5. Summary of 2 positive and 2 negative or 3 positive or 3 negative statements
   Same level of abstraction as the stimulus statements
   Complete grammatical sentence subordinating or coordinating appropriate relationships
   Example: Owning a car can help with a job, with social life, and with getting around.

4. Summary of 2 positive and 1 negative or 1 positive and 2 negative statements
   Higher level of abstraction or same level as stimulus statements
   Complete sentence subordinating or coordinating appropriate relationships
   Example: Owning a car can help with a job but teens have accidents so their insurance costs more.

3. Summary of any selections
   Higher level of abstraction
   Statement of topic but not in sentence form
   Example: The dangers of running.

2. Summary of any selections
   Same level of abstraction as stimulus statements
   Run-on sentence combining selected stimulus statements
   Example: The heart and lungs work better and some runners get hit by cars and some runners get bit by dogs.

1. Any other responses such as paraphrasing a single stimulus sentence.
   Example: A car can help you get around.

Training for measurement systems. The two tasks described above and their scoring systems were developed by the principal investigator who was assisted in the administration and scoring by four research assistants. The assistants participated at different stages of the study. Two research assistants who collected data in the schools were enrolled in programs leading to the Master of Science degree in Education, one in Special Education and the other in English Education. These assistants were trained by the principal investigator in approximately four hours by asking them to practice administration of the tasks with the principal investigator serving as the subject. Prior to these practice sessions, the materials had been studied by the examiners for approximately four hours.

Two research assistants scored the written samples. One student was a doctoral aspirant whose work in deaf education included language coursework; the other had taught English for three years and was completing a master's degree in learning disabilities. These assistants were trained by the principal investigator who provided a detailed written set of scoring guidelines, modeled the application of the guidelines through two paragraphs, step-by-step, then assigned the scorers to complete at least two practice paragraphs step-by-step. As the practice paragraphs were scored, the principal investigator rescored them independently, then provided feedback to the scorers and had them score additional samples until interscorer reliability had reached acceptable levels on all categories. Training time for scoring the DEEP was approximately 10 hours. The only training required for scoring the ETC was the provision of written guidelines and examples.

Reliability of instruments. Temporal and alternate-form reliabilities were obtained for the DEEP and ETC tasks prior to their use in this experiment by administering them to a sample of 27 students from the same two districts from which the experimental samples were to be drawn. The reliability sample consisted of all students who returned informed consent letters, 40 of which were distributed in two physical education classes and two study halls in two buildings. Subjects ranged in age from 12 through 16 and were enrolled in grades 7 through 10. Because the reliability sample included more achievers than low-achieving students, and only one learning disabled subject, the range of scores was narrow. Reliability was determined by placing subjects into performance ranges on the basis of scores for which a percentage could be calculated. The performance ranges were: 100% to 90% - (mastery); 89% to 60% - (emerging); 59% to 0% - (remedial). The percentage of students staying in the same range across both test administrations was calculated for both test-retest reliability and alternate-form reliability.

Test-retest reliability was calculated by comparing scores of eight students resulting from two administrations of the same form of the tasks at a 10-day interval. The percentages and proportions of subjects who remained in the same performance range on the DEEP subcategories across the two writing samples were:

Conventions - 88% - 7/8
Fluency - 100% - 8/8
Spelling - 100% - 8/8
Mechanics - 38% - 3/8

Alternate-form reliability was calculated by comparing scores of 19 students from administration of Forms A and B either on the same day or on successive days. The order of administration was randomized. The percentages and proportions of students remaining in the same performance range on the Deep subcategories over the two writing samples were:

Conventions - 90% - 17/19
Fluency - 100% - 19/19
Spelling - 100% - 19/19
Mechanics - 42% - 8/19

The Mechanics measure yielded low frequencies since even with all sentences correct a given writing sample might yield a total of only six correct punc-

tuction items and six correct capitalizations. These low frequencies resulted in placement of subjects into different performance ranges if only one error occurred in one sample but not in the other. Thus, the Mechanics measure may not be as unstable as it appears here.

Test-retest reliability for the ETC task was 88% with a proportion of 7/8. Alternate-form reliability for the ETC task was 89% or 17/19.

Procedures

Each subject was asked to complete the DEEP task and the ETC task in that order. Procedures for each task are described below in terms of data collection, data compilation, and interscorer reliability.

Data collection. For the paragraph-writing portion of the experiment, the DEEP task, the subject was instructed to listen as each of four cards was read, one at a time, while typed versions of the topic cards were on the table facing the subject. The student was asked to select one topic and write one paragraph using "at least six sentences." Oral directions were read in a conversational tone from a prepared script. Before the subject was permitted to begin writing, s/he was instructed, "Tell me what I've asked you to do." If the paraphrase of directions was inaccurate or incomplete, oral directions were repeated until the subject verbalized the task correctly.

Forms A and B, as described above, were randomly alternated for presentation of the topics. Form A was administered to 12 subjects in the LD group, 16 in the LA group and 13 students in the ACH sample. Form B was administered to 14 LD, 10 LA and 13 ACH subjects.

When a topic had been selected, the other three topic cards were removed. The subject was asked to read the selected topic aloud. If s/he did not read it exactly as typed, it was read aloud by the examiner. The subject then was asked to copy the topic at the top of a sheet of notebook paper. No student in the sample was unable to produce a legible copy. The subject next was given a choice of pencil or pen and asked to write a rough draft of the paragraph, then to copy it on another sheet of notebook paper to which a carbon and a second sheet had been stapled. No time limit was stated, and students were allowed to write at their own pace. However, if a subject had not begun to copy the paragraph at the end of ten minutes, the examiner said once, "Remember, you are to copy your paragraph." Time was recorded separately for rough draft and copy using a silent stopwatch held out of sight.

When the copy was completed, the original and the carbon copy were separated by the examiner. The copy was retained, and the original was returned to the subject with the instruction, "Look over your paper. Here's an eraser. Change any parts you think could be better." Time spent on revision was recorded with the stopwatch. If the student had not returned the paper to the examiner within three minutes, the examiner said at that time, "Our time is up," and collected the paper.

The topic-sentence construction task, ETC, was collected next. The following instruction was presented: "I'll show you six sentences. Pick three or four of them that go together. Write one sentence of your own. It should tell the main idea of the sentences you picked. Tell me what I asked

you to do." Following accurate paraphrase of instructions, six stimulus cards were presented, one at a time, with the examiner placing each typed card in front of the subject as the sentence was read aloud. As soon as all cards had been placed and read aloud, the examiner said, "Look at the sentences. Pick three or four." The examiner then turned on the stopwatch. If a choice had not been made by the end of the two minutes, the examiner asked: "Do you want me to read them again?" If the response was affirmative, the examiner reread all cards. If negative, the examiner said, "You need to choose now." Selected sentences remained on the table facing the subject; those not chosen were removed. The examiner provided a pencil and a pen and a piece of notebook paper. "Look at the sentences you picked. Write one sentence that tells the main idea of all of them." After three minutes, timed with the stopwatch, the examiner said, "Our time is up." If the subject was still working, s/he was allowed to finish before the paper was collected.

Time limits established for these procedures were meant to be guidelines for the examiner and the subject, so that both would have a reasonable estimate of the time to be spent on each task. The limits were not intended to be rigidly imposed; the examiners were instructed to obtain the samples even if time limits had to be extended.

Senior high subjects were scheduled for one 50-minute period, junior high subjects for one 45-minute period. This time proved sufficient for all ACH subjects and the majority of senior high LA and LD subjects. Those junior high subjects who did not have enough time for the ETC task at the first session were rescheduled for a portion of a class hour on a subsequent day. All subjects completed the DEEP task in a single session.

At each testing site, schedules for students were made up by a secretary or the principal, with no identifying information other than the student's name. As each student reported for testing, the examiner assigned a number, which was placed on all products generated by the student. This procedure resulted in random assignment of numbers so that students in the three groups had an equal chance of drawing a specific number. There was a single series of numbers for three groups from four buildings. The list of names and assigned numbers was given to the principal investigator after data had been collected in each building and was subsequently used only for the purpose of compiling demographic data. The scorers never saw student names and they could not identify from the assigned number the group to which a given subject belonged.

Procedures for administration of the experimental tasks represent an attempt to minimize the effects of some of the behavioral characteristics associated with learning disabled students which might limit inferences from the data. Oral directions were repeated or paraphrased by all subjects to ensure that comprehension of the tasks was not compromised by inattention or misperception. Instructions were read verbatim by examiners so sentence length could be controlled at nine words or less. Topic choices and detail sentences were read aloud to students and also displayed in typed form. Students were instructed to copy the selected topic, allowing examiners to observe ability to form legible letters independent of the language formulation task. Demands of the task were limited by a request for a specific number of sentences so that students would know when the task was finished. Subjects were allowed to write a rough draft of the paragraph. They were given an opportunity to revise their written product so that their optimal effort would become the object of analysis.

Data compilation. For the written paragraphs, data were compiled in file folders marked with each subject's number. The pencil original of the final revised version of the paragraph was photocopied and stapled to a record sheet (see Appendix). Paragraphs were then randomly assigned to scorers, who used a system of underlining and circling items on the photocopy with pencils of different colors to identify items under Conventions and Word Selection. Sentences as punctuated and capitalized by the subject were marked with an Arabic numeral beginning with 1. T-units were marked with a series of capital letters beginning with A. After all paragraphs had been scored and some rescored for reliability, they were grouped according to subject membership in the LD, LA or ACH group for tabulation of data.

Since the instructions to subjects had specified production of six sentences, an arbitrary decision was made to include for comparison only those scored paragraphs which offered at least five T-units for analysis. Paragraphs which contained fewer than five T-units were removed from the group before the final random selection of LA and ACH samples which took place after LD subjects had been validated.

ETC samples were matched with DEEP subject numbers so that the productions of the same groups of students would be analyzed. ETC samples were scored before being placed into groups according to membership in LD, LA or ACH groups.

Interscorer reliability. Reliability on scoring of the written paragraphs was obtained by means of independent scoring of 20% (16/78) of the paragraphs over all scorable items by a second research assistant. The scorers' recording sheets were compared item-by-item. Interscorer reliability for Conventions ranged from 86% to 92% with a mean of 88%. for MMTU from 72% to 97% with a mean of 83%, for Word Selection from 78% to 84% with a mean of 80%, for Spelling from 95% to 100% with a mean of 97%, and for Mechanics from 80% to 100% with a mean of 91%. Reliability was calculated by dividing the total number of items on which the scorers agreed by the grand total for each category over the paragraph.

Interscorer reliability was calculated on the ETC task by independent scoring of 20% (16/78) of the topic sentences. Scorers assigned the same value on 14 of the 16 papers, for a reliability figure of 88%.

Research Design

It was hypothesized that there would be no differences between the LD group and the LA group, or between the LD group and the ACH group, on percentage of Conventions correct, mean morphemes per T-unit, percentage of correct Spelling, or percentage of Mechanics correct over the DEEP paragraph-writing task. It was further hypothesized that no differences would emerge from comparison of the ETC task across three groups. DEEP results were compared by both statistical tests and inspection. ETC results were compared by inspection.

A distribution-free, non-directional two-sample rank test based on the Mann-Whitney U Test (Ryan, Joiner, & Ryan, 1978) was used to test differences between medians. Alpha level was set at .01. To minimize the differences in

productivity among the three groups, the figure used for comparison for all measures except Fluency was the percentage correct.

Results

Comparison of DEEP Scores

Results of statistical tests comparing percentage correct for LD students with percentage correct for LA subjects on Conventions, Spelling and Mechanics over the paragraph-writing task revealed that two of three differences were not significant. Although the LA group earned higher median scores on both Conventions and Spelling, only Spelling scores were significantly different. Comparison of mean morphemes per T-unit as a measure of Fluency did not reveal significant differences between LD and LA groups.

Statistical tests comparing percentage correct for the LD group with results for the ACH group on paragraphs yielded significant differences favoring the ACH group on Conventions, Spelling and Mechanics. Differences between mean morphemes per T-unit were also significant in favor of the ACH group.

Conventions. Table 1 shows results of comparing performance of LD and LA groups on the total percentage correct over five subcategories. The finding was not significant in favor of the LA group.

Table 1

Comparison of Median Percentages Correct for Conventions for LD and LA groups

Groups	N	Median	U Value	Level of Significance
LD	26	93.50	581.5	0.0502
LA	26	100.00		

Table 2 shows results of comparing percentage correct for the LD and ACH groups. The probability was significant in favor of the ACH group.

Table 2

Comparison of Median Percentages Correct for Conventions

for LD and ACH Groups

Groups	N	Median	U Value	Level of Significance
LD	26	93.5	511.0	0.0012
ACH	26	100		

Although 9 LD students scored 100%, the range extended to 36%. In contrast, 15 LA students scored 100% with a range down to 76%. Only five ACH students scored below 100% with the lowest score at 87%.

Table 3 shows total frequencies for each of the subcategories of Conventions. In each subcategory, both the LA group and the ACH group used a higher frequency of correct items than did the LD group. In each subcategory of the three classes of markers--verb, plural and possessive--the LD group used less than half the number used by the ACH group.

Table 3

Absolute Frequencies of Conventions

for Three Groups

	LD	LA	ACH
Verb Markers	42	58	93
Plural Markers	75	122	166
Possessive Markers	22	26	45
Subject-Predicate Number Agreement	240	281	278
Pronoun-Referent Number Agreement	26	41	57

Inspection of error patterns revealed that noun plural errors and subject-predicate number agreement errors were the highest frequency categories for both the LD and LA groups. When three types of markers--verb, plural and possessive--were inspected for individual subjects, those LA subjects using the highest frequencies of such markers (17, 15) demonstrated the lowest frequencies of errors (1 and 0, respectively). In contrast, the three highest frequencies among LD subjects (14, 12, and 10) were accompanied by high error rates (10, 9, 9).

Fluency. The statistical test conducted for Fluency measures compared mean morphemes per T-unit. Table 4 shows the results of the comparison between the LD and LA groups, which was not significant. The LD group demonstrated a higher median.

Table 4

Comparison of Median Scores on Mean Morphemes per T-Unit for LD and LA Groups

Groups	N	Median	U Value	Level of Significance
LD	26	12.3	699.5	0.8548
LA	26	11.5		

Table 5 shows the results for the comparison of the LD group with the ACH group. This test confirmed significant differences between the groups in favor of the ACH group.

Table 5

Comparison of Median Scores on Mean Morphemes per T-Unit for LD and ACH Groups

Groups	N	Median	U Value	Level of Significance
LD	26	12.3	508.5	0.0010
ACH	26	15.0		

The range for the LD group on mean morphemes per T-unit was 5.9 to 18.7. For the LA group the range was 4.7 to 15.4. The ACH group range was 7.0 to 22.0.

The median MMTU by grade level, as ranked for five to nine students per grade, emerged in the LD group as 13.5 for 7th grade, 11.0 for 8th grade, 11.5 for 9th, 12.1 for 10th. In the LA group, medians were 11.2 for 7th grade, 11.6 for 8th grade, and 12.2 for 10th grade. Only two ninth-grade students were in the LA group (4.7 and 15.0 MMTU).

The two 7th grade students in the ACH group used 12.0 and 15.0 MMTU, respectively. The median was 13.9 for 8th grade, 15.8 for 9th, and 13.5 for 10th grade.

Because the LD and LA groups' ranges did not cluster by grade levels, mean MMTU for each grade level was distorted due to extreme scores. In the ACH group, however, scores tended to cluster by grade level. Means were calculated for the ACH group for 6 students in 8th grade at 14.6, for 7 students in 9th grade at 15.2 and for 11 students in 10th grade at 16.2.

Table 6 shows the distribution of sentence types and fragments for three groups. In all groups, the highest frequency occurred for simple sentences, the second-highest for complex sentences. For both LD and LA groups, run-on sentences were third in frequency of occurrence.

Table 6

Percentage of Five Sentence Types and

Fragments for Three Groups

	LD Mean	LA Mean	ACH Mean	LD Median	LA Median	ACH Median
Simple	41.8	46.3	59.8	53.5	43	67
Compound	4.6	6.4	4.6	0	0	0
Complex	28.8	27.3	28.9	30.5	20	28
Compound/Complex	3.4	6.3	3.8	0	0	0
Run-on	18.3	11.1	1.8	0	0	0
Fragment	3.0	2.3	.9	0	0	0

All sentence types occurred in all groups. The mean percentage of compound, complex, and compound/complex sentences was almost identical for the LD and ACH groups, and differed only one or two percentage points between the LD and LA groups. However, the comparison of median percentages indicates that only simple and complex sentences were evenly distributed within each group.

When individual records were examined, nine of 26 LD students accounted for the run-on sentences in that group, with a range of 14% to 100% of their sentences in that category. Three LD students used no other sentence type, writing run-on sentences of 100, 70 and 55 words, respectively. In the LD group, four students accounted for the fragments, with a range of 14% to 33% fragments in individual records.

In the LA group, 11 of 26 students accounted for the run-on sentences, with a range of 14% to 80%. Three students in this group used fragments with a range of 14% to 33%.

Four of 26 students in the ACH group used run-on sentences, for a range of 9% to 17% of their sentences. Two students wrote fragments for 9% and 14% of their sentences, respectively.

Table 7 illustrates the mean and median percentages of complex T-units for each group. The range for the LD groups was 0% to 100% complex T-units, with three students scoring above 50%, or using complex T-units for the majority of their constructions. For the LA group, the range was 0% to 100%, with four students scoring above 50% use of complex T-units. The range for the ACH group was 0% to 100%, with four students formulating complex T-units for the majority of their constructions.

Table 7

Percentage of Complex T-units for Three Groups

	LD	LA	ACH
Mean	37.2	35.2	33.4
Median	33	33	28

Table 8 presents means and medians of total words and total morphemes produced by each group. Both low achievers and achievers wrote more total words and more total morphemes than did the LD group.

Table 8

Total Morphemes and Words

for Three Groups

	LD Mean	LA Mean	ACH Mean	LD Median	LA Median	ACH Median
Morphemes	81.1	88.3	115.2	82.0	83.5	105.5
Words	70.0	78.8	92.3	69.5	68.0	88.0

The range of total words written by the LD group was 39 to 106, by the LA group, 31 to 128, and by the ACH group, 46 to 174. The range of total morphemes written was 71 to 171 for the LD sample, 76 to 236 for the LA group, and 85 to 307 within the ACH group.

Subtracting the mean for words from the mean for morphemes allows comparison of the extent to which each group used polymorphemic words. The difference is greatest for the ACH group, which used an average of 23 more morphemes than words, while the LD group used 11 more and the LA group used 10 more morphemes than words on the average.

Table 9 shows the distribution of types of word classes used correctly under the classification of Flexibility in Word Selection. Comparison of mean frequencies of these word classes between LD and LA groups reveals that the groups' use of adverbs, secondary verbs, and determiners was nearly identical, but the LA group averaged a higher freqency of adjectives, prepositions and conjunctions. ACH subjects wrote more items in each category than did LD subjects.

Table 9

Frequency of Word Classes

for Three Groups

	LD Mean	LA Mean	ACH Mean
Adjectives	5.5	7.8	8.7
Adverbs	4.1	4.3	6.3
Secondary Verbs	2.5	2.6	3.7
Modal Auxiliaries	1.1	1.7	1.5
Have/Be Auxiliaries	1.3	1.6	2.6
Prepositions	5.1	6.7	9.[illegible]
Conjunctions	3.6	4.6	4.6
Determiners	6.3	6.6	7.9

Means for the eight categories accord with productivity relationships shown in Table 8. In each category, the mean frequencies are lowest for LD, with LA productivity in the middle position and ACH the highest. A single exception occurs in modal auxiliaries, a category comprising few items.

Table 10 permits a comparison of absolute numbers of each subcategory under Word Selection. The table shows the number of each type of word correctly employed by each group. Although absolute frequencies vary with productivity in words, adverbs, secondary verbs, and have/be auxiliaries were selected by LD and LA subjects in similar numbers.

Table 10

Absolute Frequencies of Word Classes

for Three Groups

	LD	LA	ACH
Adjectives	143	203	226
Adverbs	107	112	165
Secondary Verbs	65	68	97
Modal Auxiliaries	29	44	38
Have/Be Auxiliaries	34	42	68
Prepositions	133	174	235
Conjunctions	93	120	120
Determiners	165	172	205

When the figures in Tables 9 and 10 are ranked from most frequent to least frequent, the rankings for the LD and ACH groups are nearly identical. Only the relative positions of Determiners and Prepositions are reversed in first and third positions. For both groups, Adjectives are second, Adverbs fourth, Conjunctions fifth, Secondary Verbs sixth, Have/Be Auxiliaries seventh, and Modal Auxiliaries eighth in frequency.

Another fluency measure which can be discovered by inspection is the ease with which a writer can summon a vocabulary word. Use of a word which does not suit the context exactly but which has some features in common with the appropriate word might be said to be a measure of availability of vocabulary on demand. Two structures occurred within the LD paragraphs which can be analyzed from this point of view: "More people watch football than soccer . . . but soccer is checking (catching) up." ". . . but if we don't which it (watch it), there won't be any . . ". Word substitutions of this type did not occur among LA or ACH samples.

The frequency of omission of essential words in sentences is also a measure of fluency. Minor omissions occurred within all groups when the rough draft was copied. Therefore, words were considered to be omitted only if the omission occurred on both the rough draft and the final copy. In the LD group, eight omissions of essential words contrasted with two such omissions in the LA group and none in the ACH group. Omissions in the LD paragraphs included (the word presumed to be intended is in brackets) main verbs (. . . you do [use] your hands . . .), auxiliary verbs (. . . men [are] staying home . . .), nouns (. . . are alike in many [ways]), and prepositions (One way is [in] soccer you can use . . .).

Still another aspect of fluency in which the LD group differed was the non-idiomatic use of function words. Five occurrences were recorded among the LD paragraphs but only one in the LA group and one among the ACH writers. Examples included conjunctions (. . . longer as [than] in football), prepositions (. . . the object to [of] the game is . . .), and infinitives (. . . you have a [to] shoot a basket . . .).

Spelling. Table 11 shows the results of comparing median percentage correct on spelling for the LD and LA groups. The difference is significant in favor of the LA group.

Table 11

Comparison of Median Percentages Correct on Spelling

for LD and LA groups

Groups	N	Median	U Value	Level of Significance
LD	26	90.00	454.0	0.000
LA	26	97.5		

Table 12 shows the comparison of median scores for the LD group and the ACH group. Again, the difference is significant, in favor of the ACH group.

Table 12

Comparison of Median Percentages Correct

on Spelling for LD and ACH Groups

Groups	N	Median	U Value	Level of Significance
LD	26	90.0	395.0	0.000
ACH	26	98.0		

The range of correctly spelled items for the LD group was 61% to 97%. For the LA group the range was 84% to 100%. The ACH group's scores on spelling ranged from 91% to 100%.

Table 13 illustrates the distribution of types of spelling errors among the three groups. For all three groups, the most frequent error was substitution of a single vowel. The broader category of single-vowel errors accounted for 25% of LD errors, 28% of LA errors and 19% of ACH errors. For the LD group, the second-highest frequency of errors occurred when single consonants were constrained. The LA group made nearly equal percentages of errors on single consonants and on silent vowels. For the ACH group, the second-highest frequency of errors was omission of one or more letters from a consonant cluster. Both LA and ACH groups made a higher percentage of errors than did the LD group on insertion of silent vowels, sequencing and spacing. The LA group made a higher percentage of homophone errors. The only errors which occurred in the LD group but were not represented in the other groups were: (a) insertion of an extra vowel in a vowel cluster, (b) omission and substitution of double vowels, and (c) form reversal. In each of these categories, the freqency of errors in the LD group was one or two. Table 14 shows absolute frequencies, many of which were too low to permit meaningful comparison of percentages.

The range of percentage correct on spelling words was 61% to 97% for the LD group, 84% to 100% for the LA group, 91% to 100% for the ACH group. Six LA students and eight ACH students spelled all words correctly. In terms of absolute frequencies of misspelled words, the LD range was 3 to 22 errors. The highest individual frequencies in the LA and ACH groups were 11 errors and 8 errors, respectively.

Mechanics. The results of comparing total percentages for punctuation and capitalization for the LD and LA groups are shown in Table 15. The difference was not significant.

Table 13

Percentage of 14 Types of Spelling Errors

for Three Groups

	LD	LA	ACH
Vowels			
Single			
Omission	4.1%	10.1%	1.9%
Substitution	19.4	14.6	17.3
Insertion	1.4	2.2	0
Cluster			
O	4.4	3.4	5.8
S	4.9	2.2	3.9
I	*	0	0
Double			
O	*	0	0
S	*	0	0
I	0	0	0
Silent			
O	7.0	6.7	1.9
S	0	0	0
I	3.4	4.5	7.7
Consonants			
Single			
O	4.1	2.2	3.9
S	8.2	6.7	5.8
I	2.6	2.2	1.9
Cluster			
O	6.3	4.5	9.6
S	2.2	2.2	1.9
I	*	0	1.9
Double			
O	4.1	5.6	3.9
S	*	0	1.9
I	1.8	3.4	1.9
Silent			
O	1.1	0	0
S	0	0	0
I	1.1	0	0
Homophone	4.9	10.1	3.9
Sequence	4.1	9.0	11.5
CV-VC Combination			
Omission	2.2	1.1	1.9
Insertion	1.1	1.1	0
Spacing	5.6	6.7	7.7
Form Reversal	*	0	0
Illegible	2.6	1.1	3.9

* Less than 1%

Table 14

Frequency of 14 Types of Spelling Errors

for Three Groups

	LD	LA	ACH
Vowels			
Single			
Omission	11	9	1
Substitution	52	13	9
Insertion	4	2	0
Cluster			
O	12	3	3
S	13	2	2
I	1	0	0
Double			
O	2	0	0
S	1	0	0
I	0	0	0
Silent			
O	19	6	1
S	0	0	0
I	9	4	4
Consonants			
Single			
O	11	2	2
S	22	6	3
I	7	2	1
Cluster			
O	17	4	5
S	6	2	1
I	1	0	1
Double			
O	11	5	2
S	2	0	1
I	5	3	1
Silent			
O	3	0	0
S	0	0	0
I	3	0	0
Homophone	13	9	2
Sequence	11	8	6
CV-VC Comb			
Om	6	1	1
Ins	3	1	0
Spacing	15	6	4
Form Reversal	1	0	0
Illegible	7	1	2
Total	268	89	52

Table 15

Comparison of Median Percentages Correct for Mechanics

for the LD and LA Groups

Groups	N	Median	U Value	Level of Significance
LD	26	81.00	700.0	0.8476
LA	26	78.00		

In Table 16, the results of comparison of the median scores for the LD and the ACH groups indicate that the differences are significant in favor of the ACH group.

Table 16

Comparison of Median Percentages Correct for Mechanics

for the LD and ACH Groups

Groups	N	Median	U Value	Level of Significance
LD	26	81.0	503.5	0.0007
ACH	26	93.0		

The range of scores for the LD group on Mechanics was 14% to 100%. For the LA group it was 44% to 100%. The ACH group's scores ranged from 65% to 100%. Table 17 shows the percentage of students in each group who correctly indented the paragraph and maintained the first, second or third person throughout the paragraph. Among the LD students, 10 failed to indent and six shifted person. In the LA group, eight students failed to indent. In the ACH group, four students did not indent the paragraph.

Table 17

Percentage of Paragraphs Indented and Consistent for Person for Three Groups

	LD	LA	ACH
Indented	62%	69%	85%
Person	77%	100%	100%

On the paragraph-writing task, the LD group took an average of 9 minutes, 13 seconds for the rough draft and 7 minutes, 11 seconds for the copy. The LA group spent an average of 7 minutes, 23 seconds on the rough draft and 6 minutes, 47 seconds for the copy. Among the ACH group, the rough draft consumed an average of 7 minutes, 6 seconds, while the copy took 5 minutes, 18 seconds. The range of time spent on each part of the task varied a great deal more among LD subjects than among either of the two other groups.

The LD group was the only one of the three which included subjects who took longer to copy the paragraph than to write the rough draft without making appreciable changes in the copy. That is, among the LD students who took longer to copy than to formulate the original paragraph, no changes beyond spelling differences were made between draft and final copy. On the other hand, those students among the LA or ACH groups who took more time on the copy than on the rough draft had made considerable content changes in the paragraph in the course of copying it, as measured by comparing the draft version with the final copy.

One additional informal comparison was drawn among the written paragraphs. Inspection permitted comparison of the groups on their use of a topic sentence. Subjects who employed a topic sentence numbered 12 in the LD group, 12 in the LA group and 22 in the ACH group. Since the directions for the paragraph-writing task did not include a specific request to incorporate a topic sentence, this result is considered to represent spontaneous formulation of a topic sentence as an integral part of the paragraph-writing task.

Results of comparison of paragraph scores by statistical tests revealed that the LA group earned higher median scores than did the LD group for Conventions, MMTU, and Spelling, but only Spelling was significantly different in favor of the LA group. All differences between the LD and ACH groups were significant in favor of the ACH group. Inspection of tables disclosed both differences in distributions on some measures and similarities in rankings on others.

Comparison of ETC scores

No statistical tests were conducted over ETC results. By inspection, frequencies of each of the eight possible scores were compared. The tabulation, which appears in Table 18, indicated that LD students were represented in every step of the hierarchy of scores; LA students scored no topic sentences utilizing two positive and two negative statements; and ACH students scored neither sentence attempts nor topic references not incorporated into a sentence. Results further indicated that five LD and five LA students scored in the top two positions in the scoring hierarchy, while 14 ACH students did so. The lowest available score, representing a response which did not in any way incorporate the selected statements, was earned by 11 of the LD, six of the LA and three of the ACH subjects.

Table 18

Frequencies of Eight Topic Sentence Scores

for Three GRoups

	LD	LA	ACH
Score	N=26	N=26	N=26
8	2	0	5
7	3	5	9
6	2	4	0
5	1	2	3
4	2	2	2
3	1	5	0
2	4	2	4
1	11	6	3

Discussion

Results which indicate that three of four measures of written language yield no significant differences support a conclusion that LD and LA subjects are more alike than different in their performance on formal aspects of written expression. Yet the significant difference in frequency of misspelled words and the variations in error patterns on other measures offer intriguing glimpses of possible discriminating features which subsequent studies may prove to be more characteristic of one group than of the other.

Significant differences on four written measures reveal consistent quantitative superiority of ACH students over LD students on formal aspects of written language. However, inspection of written features not subjected to statistical tests reveals a number of similarities between LD and ACH students which have not been reported in the literature.

Conventions

Although both LA and ACH groups earned higher median scores on written Conventions than did the LD group, identical rankings in frequencies among five subcategories for written samples indicate that LD students use markers in the same relative proportions as do achievers. This finding contradicts Wiig and Semel's (1976) report of agrammatical morphology as a characteristic of the language of the learning disabled.

On the other hand, LD writers tended to place themselves under constraint to use markers less frequently than did the ACH group, who used a much higher absolute frequency of each subcategory. Moreover, those LD students who did elect to use a high number of markers did so unsuccessfully. Though markers cannot be avoided altogether, the use of high frequencies of markers is not necessary in free writing. LD subjects who used them in large numbers but used them unconventionally prompt questions about their level of adaptive behavior.

Fluency

Comparison of median MMTU for the LD and LA groups did not reveal discriminating differences on written samples. The two groups are too similar to permit the use of MMTU as a diagnostic indicator. It is, apparently, just as likely that a student with a relatively low MMTU is a member of the low-achieving population as of the LD population.

Because of small groups at each grade level, the question of a plateau as suggested by Myklebust (1973) must remain open. Examination of group means for MMTU by grade level through comparison with Hunt's (1965; 1970) data is impractical because groups in the present study were smaller and unevenly distributed among grades. Furthermore, extreme scores within LD and LA groups distorted means. However, comparison of just the ACH group means against grade-level scores for mean words per T-unit reported by Hunt indicates that the achievers in the present study followed a sequential progression similar to that demonstrated by Hunt's subjects. This finding suggests that the achievers in the present study were in this respect drawn from the same population as Hunt's larger sample and were, therefore, an appropriate group with whom to compare the MMTU medians attained by LD and LA groups, for whom no previous MMTU figures are available.

Comparison of median MMTU scores for LD versus ACH students (Table 4) yielded significant differences which indicate that LD students write relatively unelaborated T-units. That is, the subject-predicate relationships are present to constitute an acceptable T-unit, but LD students do not elect to incorporate as many optional morphemes as do ACH students. Comparison of the difference between total words and total morphemes (Table 8) confirms that LD students write fewer polymorphemic words than do ACH students. The aforementioned distribution of numbers of verb markers, plural markers and possessive markers, counted as morphemes, account for part of the difference (Table 3). However, inspection of vocabulary items revealed that LD students appear to use more words in root form while both LA and ACH students are more likely to elaborate a word by combining morphemes.

The finding that both LA and ACH students wrote more words than did LD students is in accord with previous reports by Myklebust (1973), Weiner (1980) and Poteet (1979). The difference between the LD and LA groups on total words and total morphemes used in written products offers no diagnostic indicators.

The finding that LD students use all the same word classes as do ACH students and that they use them in almost exactly the same proportions (Tables 9 and 10) in their written productions was unexpected. This result directly contradicts reports by Wiig and Semel (1976) that LD students demonstrate an impoverished vocabulary.

Examination of relative percentages of sentence types (Table 6) indicates that LD students use all types of mature structures including compound/complex sentences, the most sophisticated form, on a par with achieving students. The ranking of relative use of mature sentence forms is the same for LD and ACH groups. These findings support a conclusion that LD and ACH writers are alike in regard to demonstrating flexibility in sentence structure. The variety of sentence patterns used by the LD subjects in this sample directly contradicts Wiig and Semel's (1976) statements that LD students use incomplete and agrammatical sentences.

On the other hand, LD students may be more than 10 times as likely as achievers to write run-on sentences, and three times as likely to write a fragment. The run-on sentences cannot be classified as either incomplete or agrammatical; they are simply not punctuated or capitalized as sentences. The fragments can be considered agrammatical, but they account for only 3% of the total of LD sentence structures. It may be that sentences which are being judged as incomplete or agrammatical are well-constructed T-units which lack sentence boundaries of periods and capital letters on initial words.

No sentence-construction differences were found between LD and LA groups which could be construed as diagnostic indicators. Flexibility in sentence structure and use of run-on sentences and fragments do not appear to discriminate between these two groups.

The most important finding of strength among LD writers is the percentage of complex T-units (Table 7). This comparison is the best indicator of syntactic maturity because it is uncontaminated by productivity measures and it permits analysis of subject-predicate construction apart from sentence boundary markers of capital letters and periods. The construction of subject-predicate relationships for independent, subordinate and embedded clauses by LD students is on a

par with formulations by ACH students. This finding does not negate the higher percentage of fragments among LD writers, but it establishes that LD students demonstrate effective complex T-unit construction within their run-on sentences. The finding further implies that it is not sentence-construction skills which must be taught; rather sentence boundary markers such as capital letters and periods must be mastered by the LD writers who demonstrate sentence-formulation skills. This finding argues strongly that written productions of LD students must be evaluated by T-units rather than by sentence units.

The failure of complex T-unit construction to distinguish between LD and ACH students contradicts anecdotal data and interpretations of data by Wiig and Semel (1976). If LD students are capable of formulating complex structures consisting of a variety of dependent clauses attached to intact main clauses, they demonstrate sentence sense adequate for written communication. Furthermore, they revealed in this study a greater willingness to risk complicated constructions than did the ACH students, who preferred the safety of simple constructions.

On two other measures of written language fluency, word omissions and idiomatic use of function words, the LD students differed from both LA and ACH groups. Though omissions were not high in absolute frequency, differences between the LD group and non-LD students confirmed Poteet's (1979) observations. The use of an inappropriate word, found only among LD written samples, also sets that group apart. Though word-retrieval problems cannot be inferred from these data, that is a possible explanation for the behavior.

Spelling

The finding that spelling performance discriminates LD students from LA students offers promise that spelling scores from similar free-writing samples could be used to distinguish LD students from the larger population of low achievers. If replicated, the relative frequency of types of errors could add detail to probability formulas employed to identify LD students.

Because medians for total words written by the LD and LA groups were so similar (Table 8), comparison of absolute frequencies of error types is possible. The errors with the strongest probability of occurring within the LD sample with much higher frequency include substitution of single vowels, omission of silent vowels, substitution of single consonants, omission of a consonant from a cluster, omission of a consonant-vowel or vowel-consonant combination, spacing errors and illegible words or word attempts. Conspicuously absent from this list are sequencing errors and form-reversal errors, both of which have been associated with LD writing in anecodotal reports (Boder, 1971).

That sequencing problems represented a higher percentage of errors among both LA and ACH groups than within the LD group is an unexpected finding. Since six different students accounted for the sequencing errors in each of the LA and ACH groups, the errors can be said to be as characteristic of these groups as of the LD group, in which nine students accounted for errors in sequencing.

Mechanics

Because the Mechanics measure may be unstable, the finding that LD students earned a slightly higher mean than did LA students offers no promise for

discriminating the groups. Significant differences between LD and ACH groups must be interpreted with reservations, but here the differences are much greater. The need of LD students for mastery of sentence-boundary markers is confirmed by Mechanics scores, which are in accord with Poteet's (1979) results indicating significantly lower performance among LD students.

Paragraph indentation did not distinguish LD students from low achievers. Shift in person did set LD writers apart from both LA and ACH students, though the number of LD subjects who shifted person was small. It may be speculated that instruction in such a stylistic feature might not enjoy a high priority among teachers of students who lack many basic skills; consequently, some LD students may not have been exposed to this requirement for written paragraphs.

Topic Sentences

Although the number of LD students who wrote spontaneous topic sentences was identical to the number of LA students who did so, the scores of the LD group on a task constraining formulation of a topic sentence clustered at the bottom of the scale. This discrepancy could be interpreted as supporting Wiig and Semel's (1976) contention that LD students do not perform well when precise language behavior is constrained. Since the ETC task placed demands upon reading and memory, these variables could also account for the difference in frequency of topic sentences across the two tasks within the LD group.

Summary

Although previous research has indicated that formal components of written and oral expression discriminate achieving students from students with reading and other learning disabilities, results of this study showed that only spelling errors discriminated learning disabled adolescents from the larger pool of low-achieving students with average intellectual functioning. Results also indicated that despite significant differences on four formal features, LD students are similar to achieving students in flexibility of sentence types and word types, and in percentage of complex T-units employed in written paragraphs.

Strengths exhibited by the learning disabled subjects in this study are, however, obscured by high frequencies of errors in spelling and mechanics. Classroom teachers could easily overlook the well-constructed T-units and respond instead to the missing punctuation and misspelled words. Findings from this study argue strongly that evaluation systems for written productions of learning disabled students must permit recognition of complex T-units even if they are not punctuated. Implications for instruction include high priorities upon mechanics and provision of easily accessible spelling lists of most-frequently-occurring words. Systematic instruction in T-unit elaboration to encourage the use of stylistic options and polymorphemic words is also suggested by these results.

This study analyzed only formal components contributing to judgments of quality of written language. Results argue for investigations of more substantive features of writing and oral discussion, such as appropriateness of content for the purpose, logic of argument or clarity of description, and level of abstraction of language. Development and application of procedures to measure content, along the lines of primary-trait scoring (Lloyd-Jones,

1977) or analysis of intellectual strategies (Odell, 1977) could determine specific deficits in reporting skills, and could reveal whether further features of written language are as successfully realized among learning disabled students as among achieving students.

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